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Title : Failure of Dowel Bolts of MIG-21 Aircraft			<i>Document No.</i> PD MT 8810 <i>Date of issue:</i> March 1988
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Remarks : This investigation was carried out jointly with DMRL and GTRE.			
Keywords : R-11 engine, spur gear, bevel gear, dowel bolts, interference fit, fretting fatigue.			
Abstract : The spur and bevel gears of R-11 engine fitted on MIG-21 aircraft are fastened together by a set of six dowel bolts. A series of accidents caused by the failure of the dowel bolts had been reported. Bolts from five engines were examined in detail. The tell-tale marks on the gear assembly and on the fracture surface clearly indicate that there existed a gap between the gears leading to relative motion between the bolts and the bevel gear, resulting in fatigue failure.			